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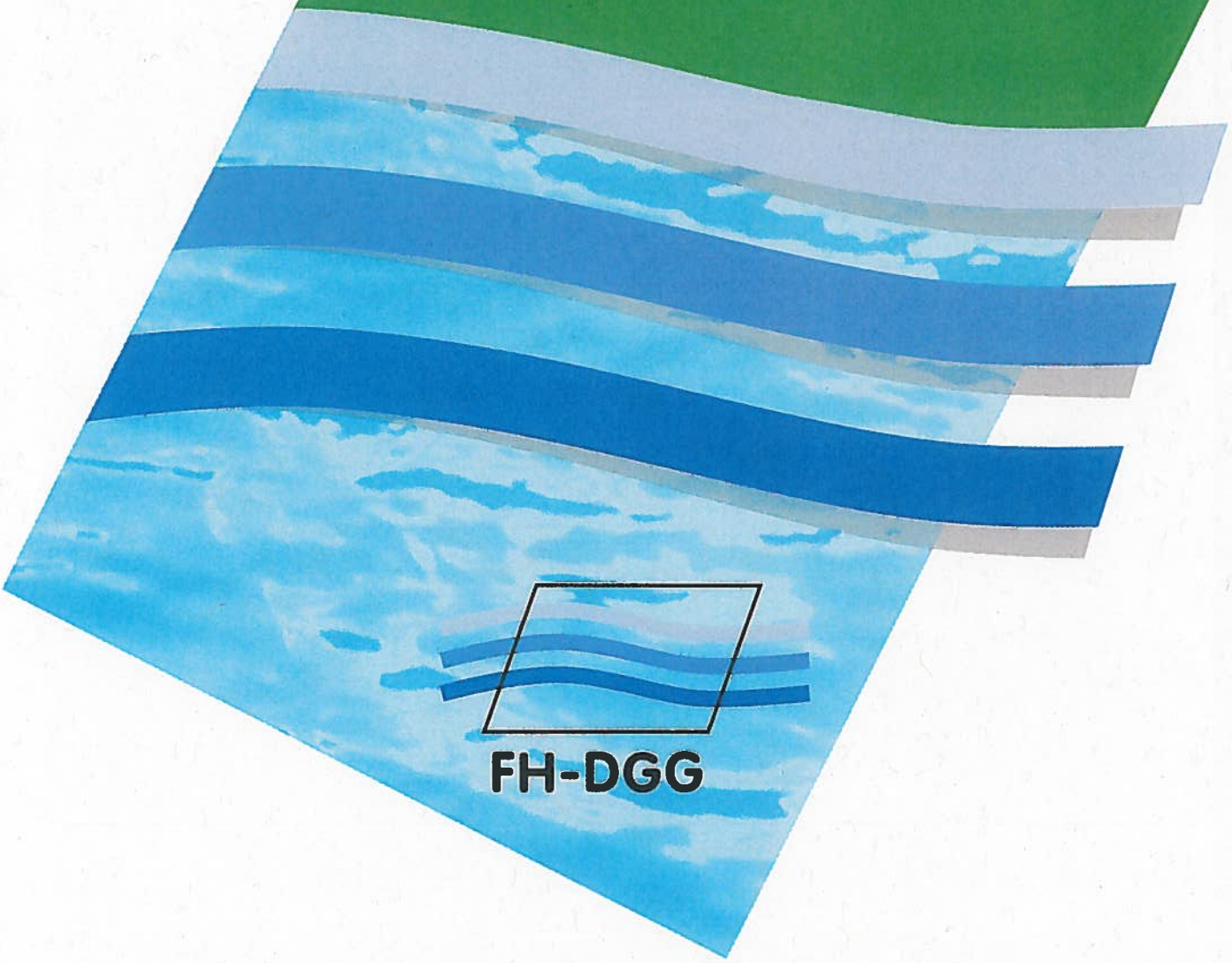
Tagung der
Fachsektion Hydrogeologie
in der Deutschen Gesellschaft
für Geowissenschaften

Grundwasser trifft Boden und Energie

Groundwater meets Soil and Energy



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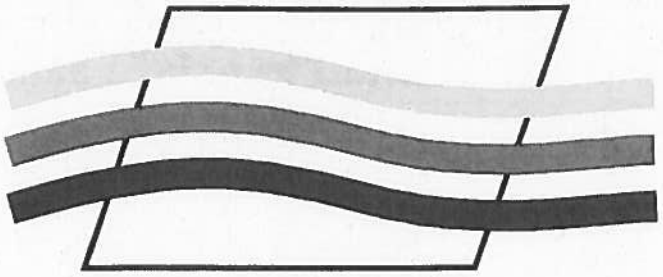

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Grundwasser trifft Boden und Energie

Groundwater meets Soil and Energy

Tagung der Fachsektion Hydrogeologie in der DGG

Universität Bayreuth
28. - 31. Mai 2014

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Stefan Holzheu, Ruth Kaufmann-Knoke & Birgit Thies (Hrsg.)

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Assessing the risks posed by contaminated sites to water resources

Poul Løgstrup Bjerg[1], Ursula McKnight[1], Julie Chambon[1], Anne Th. Sonne[1], Angelina Aisopou[1], Mads Troldborg[1], Annika S. Fjordbøge[1], Nanna I. Thomsen[1], Gitte Lemming[1], Philip J. Binning[1]

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Most countries have thousands of contaminated sites that are a legacy of the widespread use of toxic chemicals in industry and agriculture. These now pose a threat to ground water and surface water resources, freshwater ecosystems and drinking water supplies. The most common contaminants include chlorinated solvents, petroleum hydrocarbons and pesticides. The cost of cleaning up the problem is typically very large and remediation programs must therefore continue over many years. Since resources are limited, methods are required to determine the risk of contamination from the contaminant sources to downstream receptors and to prioritize remediation efforts. Traditional contaminated site risk assessment tools are focused on determining the impact of contaminated sites to local groundwater resources. They do not enable downstream impacts to be determined, for example at drinking water wells, and so are of limited use for prioritizing remediation efforts.

New methods for the evaluation of the risk posed by contaminated sites on local and catchment scale are developed in order to prioritize resource use for remediation efforts. The tools consist of several elements: i) local scale leaching models, ii) catchment scale groundwater transport models, iii) groundwater surface water interaction and contaminant plume discharge to streams, iv) toxicological assessment tools for determining the contaminant impact on surface water v) uncertainty assessment tools. The tools are used to determine the cumulative impact of all known contaminated sites in a catchment on groundwater based drinking water supplies and ecosystems, thereby identifying the worst problems.

The new catchment scale risk assessment and prioritization methods and tools have been developed by the Technical University of Denmark for the Danish Environmental Protection Agency and municipal authorities. They are developed in close collaboration by consultants and widely used by practitioners.

A common feature of methods used in i) and ii) is that they are designed to be used in the early stages of site assessment, where many contaminated sites must be considered and data is scarce and typically of poor quality. The methods are generally also using the contaminant mass discharge (mass/time) from contaminated sites, which is a useful metrics when evaluating the potential risk to water supply wells and surface water bodies. In cases where groundwater contaminant plumes are discharging to streams, determination of flow paths and groundwater discharge are essential for evaluating the transport, fate and potential impact of the plume. This implies that investigators have the tools to easily and accurately evaluate the governing parameters, so we also aim to develop and test the applicability of different methods for mapping groundwater pollution as it enters streams, as well as conceptual models that incorporate the various mechanisms affecting flow.

A strength in the research activities are a focus on the full chain from initial screening to advanced risk assessment and finally remedial actions. Recently also life cycle assessment methods have been included the tool box for selection of sustainable remediation methods. The presentation aims to give an overview of the risk assessment approaches and propose future challenges in the field.